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(54) A screen filter for a liquid-conducting device, in particular a dishwashing machine

(57) The invention reveals a screen filter for a liquid-conducting device, in particular a household dishwashing machine, that is designed flat with flow holes, separates the water-conducting space from a drainage shaft and lies at the bottom of the water-conducting space, sealing the perimeter. The invention provides that the screen is designed and manufactured as a plastic-injection mould part, that it is divided on its underside at least in partitions by injected reinforcement links in fields with flow holes arranged in rows and that it is provided with defined bearing surfaces for retainers; in doing so a screen filter is created that can be manufactured cost-effectively with optimal use of its surface space for a large overall flow surface space, but with the smallest flow holes possible, that is nonetheless sufficiently stable and rigid.

Description

[0001] The invention concerns a screen filter for a liquid-conducting device, in particular a household dishwashing machine, that is designed flat with flow holes, separates the water-conducting space from a drainage shaft and lies at the bottom of the water-conducting space, sealing the perimeter.

[0002] Such a screen filter is disclosed in EP 0 988 825 A2. The screen filter removes entrained solid particles from the liquid when draining the liquid from the space by passing it through the holes. They are held back by the screen filter and do not end up in the drainage shaft. The solid particles can be taken out when removing the screen filter and disposed of when cleaning the screen filter.

[0003] Filter screens of this type are usually designed as flexible metal punch-hole components that on the one hand can not optimally be designed in terms of flow restriction, i.e. the entire flow surface, and on the other hand cannot effectively seal the edges due to production reasons. Oftentimes the result is that small solid particles cannot sufficiently be retained and end up in the drainage shaft.

[0004] The task of the invention is to create a screen filter of the type mentioned at the outset that can be manufactured easily and cost efficiently and that is optimized in terms of flow restriction and the entire flow surface, provides an optimal sealing effect at the edges and that largely excludes the influence of material fatigue due to its design.

[0005] This requirement is solved by the invention in that it is designed and manufactured as a plastic-injection mould part equipped with flow holes that flare out in the flow direction, which are condensed to individual honeycombs in staggered row formation, that at the exterior of the edge it is provided with an orbiting, vertically aligned web that seals and is flat or linear shape, that it provides stiffening, injected reinforcement links in partitions on its underside, and that it is provided with defined bearing surfaces that enable a form fit at the edge by means of retainers even after material fatigue.

[0006] The flow holes can be selected very small such that even the smallest of solid particles are retained. The number of flow holes can be selected very large to achieve a large overall flow area while simultaneously retaining very small solid particles. At the same time, reinforcement links on the bottom of the screen filter provide the screen filter with sufficient stability and stiffness even in thin screen filters. This also achieves long, device-specific lifetimes for screen filters manufactured in this way.

[0007] The intended design of the screen filter is that it provides a material strength of approx. 1 to 1.2 mm and that the diameter of the flow holes is approx. 1 mm and a distance of approx. 2 mm in row direction. It is intended furthermore that adjacent rows of flow holes are each offset opposite to each other by half the distance and the imaginary connection lines of the midpoint of three directly adjacent flow holes form an isosceles triangle, thus the entire flow surface can be optimized to the maximum by the honeycombs, which are separated by reinforcement links.

[0008] The design of the reinforcement links provides for a thickness of between 0.5 to 0.8 mm and a height of approx. 2 mm.

[0009] In one design, optimal use of screen filter surface space is achieved in that the reinforcement links arranged on the bottom separate individual, normally constructed, hexagonal honeycombs fields, which are furnished with "2 n -1" rows of flow holes, wherein "n" is the number of holes at the edges of the honeycombs. The design provides rows of holes at the honeycomb edge with "n" flow holes and rows of holes with "2 n -1" flow holes in the middle of the honeycombs field.

[0010] The edge lining of the screen filter around the drainage shaft is improved and sealed in that a link web that protrudes vertically on the underside is designed as a sealing lip.

[0011] The seal can be improved even more by providing the edge area with a double web that protrudes vertically on the underside that is designed as a double sealing lip or that is provided at the edge with an edging that protrudes out on the bottom side that is provided with receptacles for attaching an elastic sealing element.

[0012] Draining the liquid from which solid particles have been removed can be improved in that the profile of the flow holes flares out towards the underside, preferably designed as truncated cones.

[0013] The invention is described in more detail using the example embodiments shown in the drawings. They show:

Fig. 1,	in a perspective view, the underside of a screen filter for a dishwashing machine,
Fig. 2,	a partial view of the bottom side of a hexagonal field of the screen filter of Figure 1,
Fig. 3,	a sectional view along the line III-III of the field of Figure 2,
Fig. 4,	a sectional view along the line IV-IV of the field of Figure 2,
Fig. 5 through Fig. 7	three designs for the vertically aligned edge links of Fig. 1,
Fig. 8 through Fig. 9	the arrangement and design of the honeycomb-shape designed flow holes.

[0014] The design of the screen filter 10 shown in Fig. 1 is typical for a dishwashing machine. The opening 11 embedded in the screen filter 10 normally surrounds a coarse filter that is set in the drainage shaft, wherein the edge 12, which sticks up on the underside 13 of the screen filter 10 accepts the fit after sealing. The edge 14 that encompasses

the circumference of the screen filter 10 also protrudes on the underside 13 and serves the same purpose, as will be shown below.

[0015] The screen filter 10, which is designed and manufactured as a plastic-injection mould part is relatively thin with a material thickness of approx. 1 to 1.2 mm and can therefore be produced with little material expense. In order for the entire surface of the screen filter 10 to maintain sufficient stability, reinforcement links 15 that stick up are injected on the underside 13 next to the edges 12 and 14 that have a thickness of between 0.5 mm and 0.8 mm and a height of approx. 2 mm and separate the fields 16. These fields 16 are designed for optimal use of space as standard hexagons that border each other in a honeycomb shape and cover the vast majority of the surface space of the screen filter 10. These fields 16 are provided with rows of flow holes 17, the arrangement of which will be shown as an example.

[0016] In order to attain the greatest flow passage within a honeycomb, the holes are arranged like in Fig. 8 and 9. Flow passage is optimized in that the flow holes are arranged in the shape of an isosceles triangle. The distance "d1" equals the length of the sides. The distances "d1" and "d2" are contingent upon the minimal wall thicknesses "m" and "t" of the mould draft "a". In order to achieve maximum flow passage the screen is designed with two distances "d1" and "d2"; "d1" defines the hole spacing within a honeycomb and "d2" the minimum hole spacing between the outer holes of two bordering honeycombs (see Fig. 8).

[0017] Figure 2 shows such a surface 16 of the screen filter 10 in the view of its underside 13. Reinforcement links 15 encompass the surface 16 and the adjacent surfaces 16 link up without surface loss. The flow holes 17 have a diameter of approx. 1 mm and are arranged in rows, wherein they provide a distance of approx. 2 mm in the rows. In the example embodiment 13 rows are provided that begin and end with 7 flow holes on the edges of the field 6 and increase to 13 flow holes 17 in the middle, as shown in the sectional views of Fig. 3 and 4. Since the adjacent rows of flow holes 17 are always offset to each other by half the distance, the distance of the rows is kept small and the surface of the field 16 can be used optimally for a large flow surface, however keep the surface of flow holes 17 very small in order to retain small solid particles as well.

[0018] The flow holes 17 may continually increase in profile from the topside to the underside 13 of the screen filter 10 in order to improve the flow of liquid that has been freed of solid particles. A truncated cone-like design of the flow holes 17 has proven to be particularly beneficial, as can be seen in the partial views in Fig. 3 through 7.

[0019] The edge 14 of the screen filter 10 can be designed as a sealing lip which forms the transition from the screen filter 10 to the base 20 of the water conducting space, in order to seal the drainage shaft, as shown in Fig. 5.

[0020] Additionally, the edge can also be designed as a double sealing lip, as Fig. 6 illustrates.

[0021] Finally, the edge 14 also provides receptacles 19 that allow for the attachment or injection of a separate, elastic sealing element 30, as shown in Fig. 7.

Claims

1. A screen filter for a liquid-conducting device, in particular a household dishwashing machine, that is designed flat with flow holes, separates the water-conducting space from a drainage shaft and lies at the bottom of the water-conducting space, sealing the perimeter,
characterized in that
it is designed and manufactured as a plastic-injection mould part that on its underside (13) is divided at least in partitions by means of injected reinforcement links (15) in fields (16) with flow holes (17) that are arranged in rows.

2. A screen filter according to claim 1,
characterized in that
it provides a material strength of approx. 1 to 1.2 mm and that the flow holes (17) have a diameter of approx. 1 mm and a distance of approx 2 mm in the rows.

3. A screen filter according to claims 1 or 2,
characterized in that
adjacent rows of the flow holes (17) are each offset from each other by half the distance.

4. A screen filter according to claims 1, 2 or 3,
characterized in that
the imaginary connecting lines of the midpoints of three directly adjacent passage holes form an isosceles triangle.

5. A screen filter according to one of claims 1 through 4,
characterized in that
the reinforcement links (15) provide a thickness between 0.5 to 0.8 mm and provide a height of approx. 2 mm.

6. A screen filter according to one of claims 1 through 5,
characterized in that
the reinforcement links (15) designed as regular hexagons separates the fields (16) with rows of flow holes (17), wherein the rows, which are at the edges of the field (16), are provided with n flow holes and in the middle of the field (16) with 2n-1 flow holes (17).

7. A screen filter according to one of claims 1 through 5,
characterized in that
it is equipped at the edge with a double web (18) that protrudes vertically on the underside (13), that is designed as a double seal lip.

8. A screen filter according to one of claims 1 through 8,
characterized in that
it is provided at the edge with a double web (14) that protrudes vertically on the underside (13) that is provided with receptacles (19) for mounting an elastic sealing element (30).

9. A screen filter according to one of claims 1 through 9,
characterized in that
the profiles of the flow holes (17) grow continually larger in the direction of the underside (13), preferably designed truncated cone-shaped.

10. A screen filter according to one of claims 1 through 10,
characterized in that
it is provided with defined bearing surfaces (XX) that guarantee a favorable flow contact with retainers (XY) and also provide a positive form fit at the edge even after material fatigue has set in.

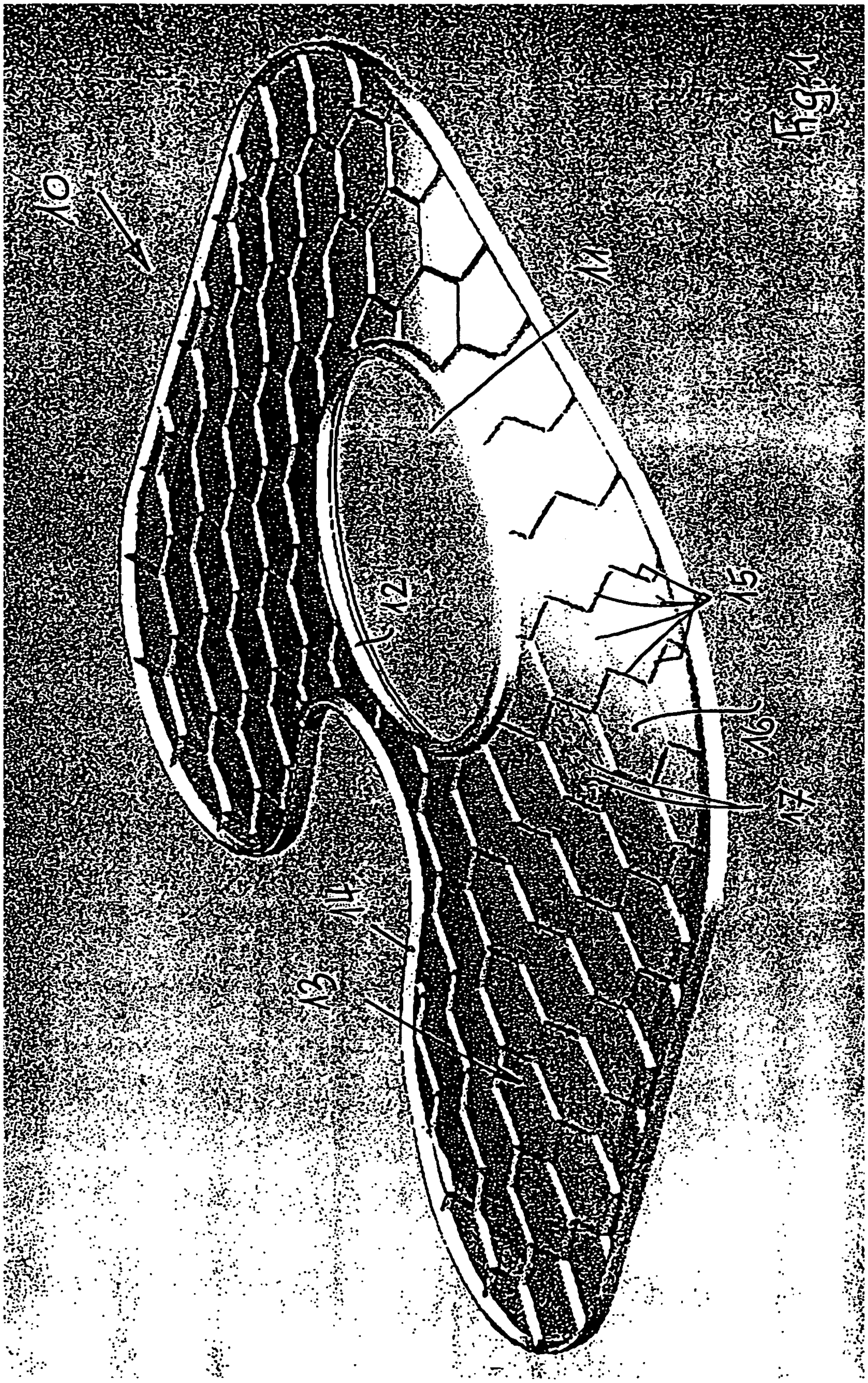

Fig. 1

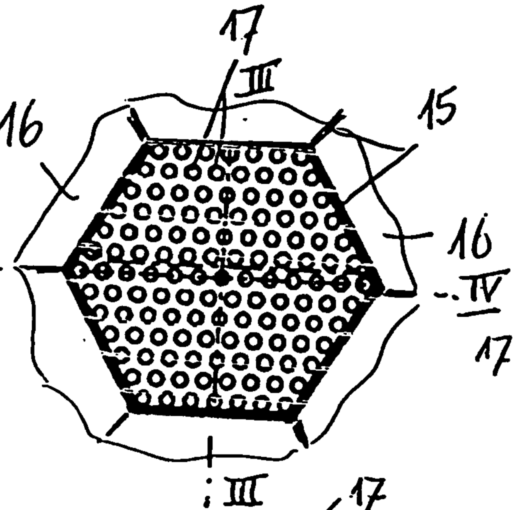

Fig.2

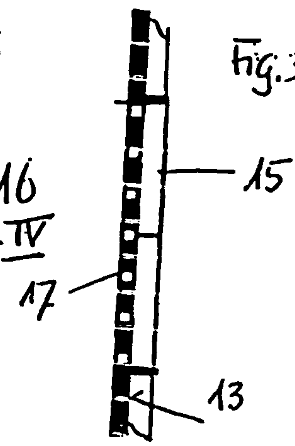

Fig.3

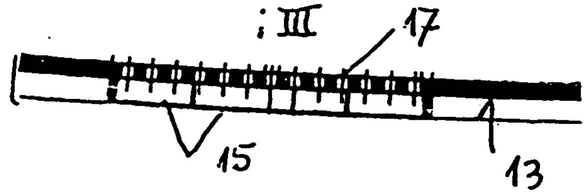

Fig.4

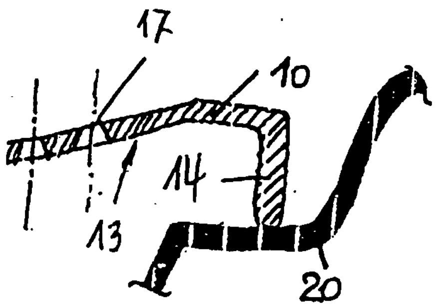

Fig.5

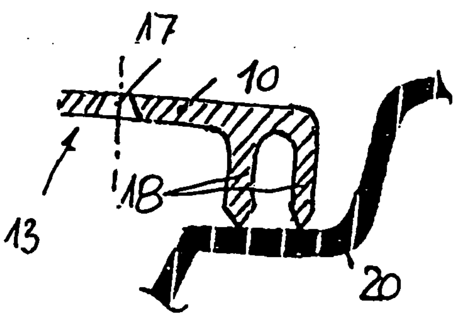

Fig.6

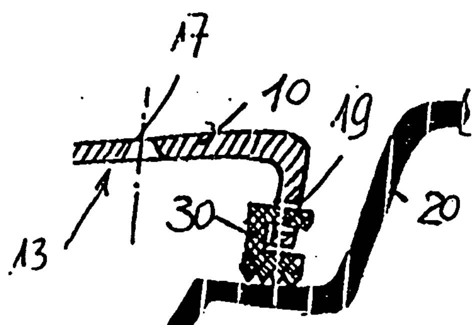

Fig.7

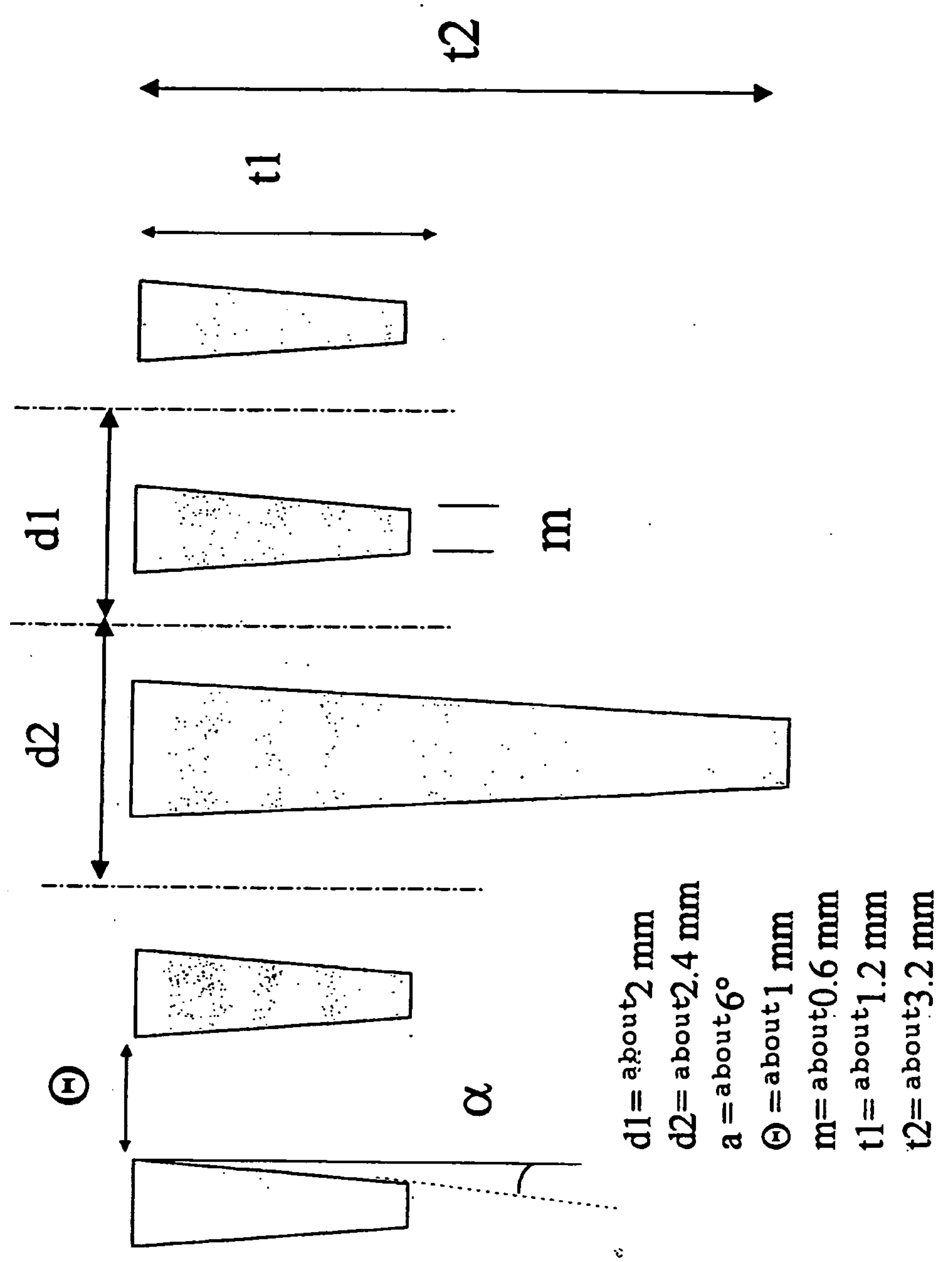
t2
t1
d1
m
d2
Θ
α
d1= about 2 mm
d2= about 2.4 mm
a = about 6°
Θ = about 1 mm
m= about 0.6 mm
t1= about 1.2 mm
t2= about 3.2 mm

Figure 8

Figure 9